RUTGERS
THE STATE UNIVERSITY
OF NEW JERSEY

COOK COLLEGE • NEW JERSEY AGRICULTURAL EXPERIMENT STATION
DEPARTMENT OF OYSTER CULTURE AT BIVALVE

MAILING ADDRESS:
SHELLFISH RESEARCH LABORATORY • P. O. BOX 687 • PORT NORRIS, NEW JERSEY 08349 • 609/785-0074

Mr. Bruce Ruppel
Department of Environmental Protection
Office of Science and Research CN-409
Trenton, NJ 08625

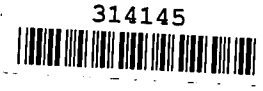
17 June 1987

Dear Bruce,

Enclosed please find a table of arsenic concentrations in Corbicula fluminea from Union Lake and Maurice River and in a sediment core from Union Lake. As you know, the animals were collected as part of the DEP-DSR sponsored project "Utilization of Bivalve Shells for Assessment of Environmental Stress" and were used primarily in shell growth analyses. Samples were obtained from the upper eastern side of Union Lake, near the confluence of the Maurice River with the lake, and at the base of the dam in Millville, where the tidal portion of the river begins. In a preliminary investigation, five animals from each site were individually digested in concentrated nitric acid and the total body burden of arsenic was determined with an atomic absorption spectrophotometer. These animals were not allowed to clear their guts prior to analysis. As you can see, the arsenic concentrations ranged from 12.9 to 38.4 ug/g (ppm) dry weight in Union Lake organisms (mean = 24.9 ug/g), and 21.6 to 48.2 ug/g dry weight in Maurice River organisms (mean = 32.5 ug/g). Chromium concentrations were also determined for each organism and none were above background levels (or greater than the reagent blank).

A sediment core was obtained from the Union Lake site on the same date (6 May 1986) as the clams were collected. The core was frozen and sectioned at 1 cm intervals and the arsenic concentration in each section was determined (see table). The surface layer had the highest arsenic concentration (as would be expected) but there was a sizable spike at 3-4 cm and also a smaller shoulder at 5-7 cm, possibly indicating pulses of arsenic and bioturbation of the upper sediment column. These data also show that the Corbicula living nearby (#1-5) contain approximately the same amount of arsenic as the sediment in the surface layers (at least within the same order of magnitude).

We hope these data are useful to you and we submit them only as a preliminary analysis, not as a detailed report on arsenic concentrations in Union Lake and associated fauna. However, as you know, we have at our disposal many other samples of Corbicula from the Union Lake, Maurice River, and Delaware River (which could serve as background controls to some degree) which we have proposed to analyze in the pre-proposal submitted to you several months ago.



Arsenic Concentrations in Corbicula fluminea from Union Lake and Maurice River.

Union Lake		Maurice River	
Organism #	ug/g (ppm)	Organism #	ug/g (ppm
1	12.9	26	21.6
2	38.4	27	22.1
3	13.6	28	48.1
4	21.2	29	33.2
5	38.1	30	37.5

Arsenic Concentrations in a Sediment Core from Union Lake

Depth in Core	ug/g (ppm)
0-1	53.1
1-2	24.6
2-3	17.3
3-4	41.6
4-5	8.0
5-6	11.0
6-7	10.2
7-8	4.3
8-9	3.2
9-10	1.0
10-11	0.2
11-12	0.3
12-13	0.2
13-14	0.4
14-15	5.2
15-16	5.0
16-17	7.0
17-18	6.2
18-19	7.4
19-20	5.9
20-21	4.9

Bruce, also enclosed is a copy of a reprint using Corbicula larvae in aquatic toxicity evaluation. The authors discuss in general two types of test, a benthic acute lethality test and a larval transformation test, but not the behavioral aspects, metabolic rate, or growth rate analysis (shell structure) we discussed. However, I think that we should still pursue the types of studies we discussed for this would develop a test with potentially a greater sensitivity for detecting the sub-lethal effects of pollutants.

Sincerely yours,

Lowell W. Fritz

Timothy R. Jacobsen, Ph.D.

Arsenic Conc in Union Lake Sediment